

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
PROVISIONAL PATENT APPLICATION

Title: Electronic Kit Bag

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SUMMARY OF THE INVENTION

This invention relates in general to computers, and in particular to the processing and translating of transportation data and functions though linear and non-linear methodologies into active operating parameters.

BACKGROUND OF THE INVENTION

The historical development of this invention, the EKB, can be examined from three general perspectives: 1) weight, 2) utility and 3) function.

1) Kit bag weight: Pilots, and other transportation professionals, routinely carry extremely heavy bags, full of paraphernalia specific to their art, including maps, calculators, logs, charts, navigation instruments, and so on. This bag is usually referred to as a "kit bag" and generally, for an aviation professional, for example, weighs between 30 and 80 pounds. According to FAA Medical and Workman's Compensation statistics, the most common loss of work time, on the job injuries, in this work group are related to moving, carrying and stowing the "kit bag": torn

shoulder ligaments, dislocated elbows, "slipped disk" back problems, and knee joints.

The problem of the heavy kit bag/injured pilot has been attempted to be solved by at least one other means, adding wheels and a handle to the kit bag, roller-suitcase style.

The following invention was originally conceived with the intention of simply solving the weight problem, as the entire contents of a traditional kit bag can be reduced to an electronic equivalent of about 3-7 lbs. However, in developing the project, other innovative and highly functional properties became apparent.

2) Utility: The current kit bag can be compared to a cumbersome sideways drawer. An area is generally left in the cockpit, to the right or left of the pilot, where the kit bag can be placed. In flight, if an item is needed from the kit bag, there often ensues an unpacking, rummaging and hunting expedition into the kit bag for the sought after manual, tool, chart, log or other desired item. The pilot is taken out of the flying-loop while this hunting expedition is in progress. Another draw-back of the old-fashioned kit bag is the traditional coffee-spill. Coffee-cup holders in the cockpit are generally placed right above the kit back stowage compartment. A kit bag is not

considered "broken in" until at least one cup of coffee,
orange juice or other non-paper friendly liquid has spilled
into the contents of the kit bag and ruined the most
important documents needed for the flight in progress, as
5 well as any other important paperwork contained therein.

Further, the traditional kit bag must be hauled around
like an additional suitcase. It is here that most on-the-
job injuries occur: removing the kitbag from the too tight
storage area, heaving it into overhead bins, lifting it in
and out of vans and storage facilities.

The utility problem has heretofore not been
successfully addressed. Although traditionally kit bags are
made in various shapes and from various sorts of materials
(including tin, plastic-covered card-board, canvas, etc.),
15 they all only serve to hold contents in a standard method
with the result being bulky, cumbersome and heavy.

The EKB approaches the problem from another
perspective. By changing the nature of the *contents* of the
kit bag, the nature of the exterior of the "bag" is also
20 modified. The E6-B slide rule is a device, for instance,
which can eliminate some wind charts and solve some
airspeed/ground speed calculations. Its predecessor, the
handheld calculator, designed for the same functions, was an
electronic advancement, as is the Performance Management

System, an integrated on-board aircraft system. Although these devices may individually partially contribute to certain aspects of a kit bags contents and function (see #3 following), none address the concept of deleting the load or form of the kit bag in any way, let alone the entirety all functional aspects of a kit bag. The EKB is light weight and easily manipulated. It can be moved without undue stress, strain or physical contortion. In use, it will not be below the coffee holders! Less physical storage place is needed, resulting in more cockpit room. Also, less weight is carried on-board, resulting in substantial and measurable fuel savings.

3) Function: As mentioned, with the traditional kitbag, the pilot must rummage through the contents in search of the needed material(s), taking the pilot out the immediate operating loop, and costing precious time, especially in an emergency. Often needed particulars are located in separate and disparate areas. The pilot may need to consult one manual for operating parameters, another book of charts for an off-line emergency airport, another manual for the emergency procedure, while simultaneously taking with dispatch or operations on a radio. The other pilot [in generally two-person airline crews] is left alone to fly a possibly crippled airplane, talk to the flight attendants

and passengers, and negotiate with air-traffic control.

Few attempts have been made to alleviate the duress caused by this plethora of unrelated information presented in physically unrelated forms. One limited suggestion known to this inventor was an on-board type computer which used an aircraft up-link device to managed charts. This failed FAA certification, however, partly because it relied on aircraft power. The EKB, while providing much more information as well as information processing, relies on internal battery power (although it can be "charged" from aircraft power as well). The FAA has provided, incidentally, provisional operating permission for use of the EKB on-board.

The EKB requires learning only simple key-stroke patterns to be a superior replacement for the traditional kit bag and contents in many operating situations. Optimal functionality is acquired when all mentioned inputs are interfaced and electronically "evaluated." Several steps can be incorporated in one or a few input strokes from a proficient operator.

Additionally, the EKB has the potential capability to actually "fly" the aircraft within certain parameters to a touch-down and landing.

A major improvement over the traditional "kit bag" is that the computerized version can manipulate data in a non-

linear algorithm, aggregating and sorting choices, thereby aiding in decision-making processes resulting in solutions to mathematical computations, runway selection, operating parameters, figuring pilot fatigue limits and scheduling issues. Output solutions can be interfaced with the craft, auto-pilot style, so that a craft could be manipulated through the EKB via radio/satellite/other mode transmissions by a ground operator in certain emergencies, such as crew incapacitation.

OBJECTIVES

It is the principal object of the current invention to create a device which, through the amalgamation and formalization of disparate operating data into a functional methodology that can then can be translated quickly and easily into today's operating environment, will not only make a pilot's overburdened job easier, but could save lives.

RELATED ART

In order to provide background information so that the invention may be completely understood and appreciated in its proper context, reference is made to a number of prior art patents and publications as follows:

computers
calculating devices
radios
printers
autopilots
radio-controlled aircraft/missiles

Whatever the precise merits, features and advantages of the above cited references, none of them achieves or fulfills the purposes of the present invention.

SUMMARY OF THE INVENTION

Other than through exterior suit-case like changes, organizing the contents of the standard pilot kit bag into a more manageable, user/friendly format has not been attempted. Coalescing and analyzing kit bag data electronically is a modern and sensible solution to the both the problems of physical ungainliness and practical application of the standard kit bag. Additionally, the problem of aircraft control during pilot incapacitation has also been inadequately addressed by any means other than self-help (oxygen use) or on-board autopilot capabilities. Heretofore there has been no device which offers a simultaneous, practical and coherent solution for either problem. The electronic, computerized portable kit bag

(EKB), offers solutions to both problems in a single package.

BRIEF DESCRIPTION OF THE DRAWINGS

5 Fig. 1 The Basic EKB, sample solution and construction, exterior view.

 Fig. 2 All-in one interactive headgear, sample interface, user friendly output data acquisition.

10 Fig. 3 Additional ergonomic design, EKB alternative construction, exterior view.

 Fig. 4 Current standard, internal data processing flow diagram.

 Fig. 5 Improvement # 1, internal data processing flow diagram.

15 Fig. 6 Improvement #2, internal data processing flow diagram.

 Fig. 7 Potential application, input-EKB-output processing sample.

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DETAILED DESCRIPTION OF THE INVENTION

The portable, computerized electronic kit bag (EKB) consists of standard and state-of-the-art computer parts and peripherals, interfaced for maximum utility. The EKB can be constructed similarly for several end user-operators,

including captains, pilots, commanders, drivers, dispatchers and operations personnel of boats/ships, automobiles, aircraft, spacecraft and other transportation devices. The example used here will apply to the pilot of an airliner.

5 The computer itself is a laptop type, or ergonomic variation thereof, such as a knee-top style (Fig.3). Enhancements include a translucent secondary window designed for the purpose of overlaying "heads-up" display information directly over maps, charts or other data displayed by a
10 primary computer screen. (Fig.1) Peripherals include printers, zip-drives, and other standard or non-standard computer devices. The all-in-one interactive headgear which interfaces with an EKB (Fig. 2), is a sample non-standard peripheral.

15 Input is acquired online or off-line through modem, cable, direct input, CD, DVD, floppy disk, voice-recognition, infra-red, radio (UHF, VHF), computer linking, video, digitally, scanning or any other accessible and/or compatible means, internet and intranet systems included.

20 The nature of input data and sources can be typical and/or operationally unusual. This "parent" system is linked with other extant operating systems and data bases, such as reservations, meteorological, dispatch (routing, diversion and alternate planning), load planning,

scheduling, airplane operating parameters, aircraft instruments and related systems (engine, hydraulic, GPS, inertial, radar, GPWS, collision avoidance, etc.), FAA crew rest and duty limits, union regulations and rules, charts/maps, log-books, airport analyses and any and all other links and data that may be made available to computer acquisition.

Input is manipulated internally and integrated through traditional linear, "matrix," or multi-level, cross-access "texotrix" methodology. The central operating program assesses the relationships of input data through a three-dimensional logic based decision-making algorithm. (Fig. 4,5,6), providing the user with up-to-the-minute, operating information available for pre-flight, en route, post flight or future operations. The pilot can access incremental feedback, monitor, or make adjustments at any point. Processing includes recording, coping, filing, updating, organizing, printing, and generating data, literature, schedules, routing, planning, computations and permutations of all phases of the flight needed at any given point in time.

The processing algorithm operates as follows (for example): a unit of data, or calculation, is presented as input (the wind is 240/10) the result can be accessed

immediately, (suggested runway at ORD is 22) or modified by adding another unit of data, or calculation (ice accumulating rapidly) with the result again capable of being accessed, (runway 32 longer, suggested better choice, in spite of wind) or modified (crew legality reaching hourly limit) results available, (runway 27 adequate, quicker access, legal compromise) or modifiable ... (left wing heat becomes inoperative) and so on. See Fig.6 for how the system can "think" and interpolate unrelated data sources.

Processed information is presented as factual output usable to determine operating options: formula calculations to aid in decision-making and suggested "best choice" solutions.

Output solutions can include flight planning, en route decision making moderated by weather and operating factors, financial analyses of integrated choices, fuel computations, weight-and-balance, crew planning, passenger accommodation/satisfaction result prognostication, and statistic relating to associated elements of an on-time/safe flight/travel operation, and so on.

Output can be presented directly or indirectly, electronically, graphically, printed or displayed on the system screen, or through associated systems by way of cable, infra-red, printer, modem, wireless or any other

compatible or available transfer output transfer system.

5 The EKB data output is formatted to be utilized either directly by the end user, an intermediate user, by a user through an aircraft system, or directly from the device to an aircraft system or autopilot. The EKB includes the capability of being interfaced directly with the aircraft, auto-pilot style, through "hard-wired" cable (by plugging a unit connector cable directly into the autopilot or specific system computer bay), cable-free infrared (for systems so modified to assure compatibility), electronic or other information exchange systems. The process defined by the transmittal of data from a ground based operator or system, through an on-board combined-functions device, resulting in the manipulation or active control of an operating transportation craft can be established in the following manner: the EKB includes receptivity to input in the form of voice activated commands or electronic data transfer, and can output directly to aircraft control systems. Thus, functional radio control of the aircraft can be established from ground based personnel or equipment in emergency situations, such as pilot incapacitation.

The pilot receives information from flight operations regarding a flight plan which includes departure point, destination, alternate airports, and fuel time. The pilot

then reviews and uses that information; Then the pilot
acquires a weather briefing. Then that information is used
by the pilot; Then the pilot acquires, referring to #3 and
said figure 4, information about cruise scheduling and other
5 limitations regarding the time the crew has been on duty for
this particular mission. Additionally, the pilot acquires
maintenance information about the plane from the log book on
the airplane from pilot briefings and/or from the mechanics.
Additionally, the pilot acquires load information about
10 weight and balance in reference to this particular flight.
Additionally information is obtained about passenger
concerns, e.g. particular passenger information as well as
the passenger manifest and information about the cargo,
types of cargo, restricted items, livestock, etc. With
15 this information, as it comes incrementally and linearly to
the pilot, the pilot makes modified decisions about the
flight.

Referring to fig. 5, improvement No. 1, when the
information is acquired by the pilot, as the additional
20 information is given to the pilot, the prior information
learned by the pilot is used in supplying the next new
information to the pilot. So that, for example, the first
linear information received by the pilot would be the flight
operations in this example, before the next information is

given to the pilot, the weather information given to the pilot is adjusted based on the flight operation so that the pilot can either access the information directly, e.g., from flight operations, or he can access the weather information so that the flight plan is modified by the influence of the weather information. Likewise, when the third element is added, for example, crew limits, when that information is fed to the pilot, it can modify or suggest a flight plan to be within the limits of the crew. Specifically, this improvement No. 1 ensures that the crew limits will be taken into consideration notwithstanding whether the pilot was thinking about that particular limitation or any of the other limitations or data being fed to him. The program figures the limits based on the flight operations plan in that particular circumstance. For example there are different limits based on whether the flight is domestic or international. Specifically, a crew may only have a certain amount of time left on that leg of the trip which may be shorter than the flight mission which could present a problem to the pilot. This improvement No. 1 takes into consideration the crew limits whether or not the pilot actually considered the same and this way the improvement No.1, flight operations plan is adjusted according to the weather, the crew limits, the maintenance, the load and the

passengers. Another example is for the load. The final weight and load of the plane and passenger quantity under some circumstances is figured out by the pilot especially including variables such as fuel, weather and destination.

5 Under this improvement No. 1 system, for example, if at the time of take off it was starting to rain and it was necessary for the pilot to figure out a new runway length, all these calculations can be done by the computer and assessed in real time as opposed to having the pilot have to
10 research his individual paper manuals as it is presently done for new factors in view of the rain in regards to, for example, take off length, runway length, speed of the airplane under moisture conditions and other adverse conditions. Improvement #1 cumulative adds step by step
15 information, modifying the result mechanically as needed. Referring to Fig. 6, improvement #2 the computer generally returns to the beginning step and reassesses all factors based on all present factors that this system knows, such that the points of analysis made by the system for use by
20 the pilot is re-analyzed with the newest input and output that occurs at any point along the way. In this situation, the pilot can (Option 1) review the information and make a decision, (Option 2) allow the computer to solve some of the questions and base decisions on personal

knowledge and the information provided by the computer, or
(Option 3) allow the computer to control and make the
decisions. The use of the term =93texotrix=94 [L. *texus*, to
weave, seen also in *texture*, *textile*, *context* and L. *-trix*,
5 as in *matrix*] is that of the inventor, an array of elements
in rows, columns and stacks, treated as a unit using special
algebraic laws in facilitating the study of relations
between elements, used herein reference to the processing of
information in three dimensional levels.

10 In Summary, the present invention is a portable,
computerized, electronic kit bag (EKB) consisting of
standard and state-of-the-art computer parts and
peripherals, interfaced for maximum utility, a central
operating program which assesses the relationships of input
15 data through a three-dimensional logic based decision-making
algorithm, an EKB data output formatted to be utilized
either directly by the end user, an intermediate user, by a
user through an aircraft system, or directly from the device
to an aircraft system or autopilot, a process defined by the
20 transmittal of data from a ground based operator or system,
through an on-board combined-functions device, resulting in
the manipulation or active control of an operating
transportation craft, a translucent secondary window
designed for the purpose of overlaying "heads-up" display

[illegible]